Remarks

Claims 1-35 are pending in the application. Claims 1 and 13 have been amended and claims 26-35 have been added to clarify the subject matter which Applicants regard as the invention. The present amendment does not add new matter to the application and is proper for entry after final action as discussed in detail below.

The Examiner rejected Claims 1, 4, 9, 13, 14, and 23-25 under 35 U.S.C. § 102(b) as being anticipated by *Eastwood* (U.S. Patent No. 5,451,036). The Examiner argued that *Eastwood* teaches a vortex inhibitor comprising a uniform refractory body having a generally tapering shape along a longitudinal axis from a base to a narrow end, and including a hollow chamber which may include a shaft and a sacrificial member connected to the uniform refractory body, thereby showing all aspects of the above claims.

Eastwood does not teach the pending claims of the present invention reciting a sacrificial member that is constructed to dissolve before substantially obstructing the discharge nozzle. *Eastwood's* teachings are directed at improving the strength of conventional metallurgical darts consisting of a head and tail to decrease breakage during handling. ("[t]he basic object of the invention is to provide an improved dart, and an improved method of dart assembly, compared with prior art proposals", Column 1, lines 49-51.) According to *Eastwood*, prior art proposals "consist basically of ... an attached tail ... with at least a portion of the tail extending below the head and being adapted to engage in the tap hole of the furnace[.]" (Column 1, lines 13-15.) To improve upon prior art proposals, *Eastwood* teaches "an elongated tail of refractory material ... such that the tail can pass, as a close fit, through the lining sleeve of the head" (Column 1, lines 59-64) and preferably encasing the tail "in a metallic sleeve or jacket [to provide] considerably more strength than prior art proposals, as the metallic sleeve or jacket protects the refractory during handling." (Column 2, lines 24-28.) Due to its increased strength, the improved tail taught by *Eastwood* has an even greater tendency than prior art tails to persist in the molten metal environment, thus engaging and residing in the discharge nozzle and substantially obstructing the discharge nozzle. Accordingly, the claims of the present invention, drawn to a vortex inhibitor with a sacrificial

member that is constructed to dissolve before substantially obstructing the discharge nozzle is not taught by *Eastwood*.

Moreover, *Eastwood* does not teach a vortex inhibitor that is self-orienting in a narrow end downward position when supported in molten metal. The tail taught by *Eastwood* only causes the vortex inhibitor to float in a narrow end downward position when the tail is penetrating the discharge nozzle. When freely floating in the molten metal, the tail and refractory body combination floats on its side. The vortex inhibitor of the present claims is drawn to an integral body combining the refractory body and the sacrificial member that has a specific gravity less than the specific gravity of molten metal, and is self-orienting in a narrow end downward position when supported in molten metal.

Eastwood and other refractory bodies with rods do not teach a vortex inhibitor that includes a sacrificial member that is constructed to dissolve before substantially obstructing the discharge nozzle. Moreover, *Eastwood* does not teach a vortex inhibitor that is self-orienting in a narrow end downward position when supported in molten metal. For at least these reasons, the Applicants' claims are not taught by *Eastwood* or other refractory bodies with rods. Applicants respectfully request reconsideration of this rejection in light of the present amendment and remarks.

The Examiner rejected claims 1-25 under 35 U.S.C. § 103(a) as being obvious from the teaching of the *Eastwood* reference. With the ordinary skill in the art, *Eastwood* does not teach, suggest, or motivate the claimed invention. *Eastwood* teaches a structure for improving the longevity and ease of constructing tailed, throttling elements. The ordinary skill in the art recognizes deterioration of a tail in and out of molten metal and teaches how to avoid deterioration by providing a reinforced tail. Moreover, prior art tails provide a signal that slag intermixture is imminent and flow should be terminated. In substantial departure from the prior art, the Applicants' invention teaches how to sacrifice structural integrity to avoid substantial throttling of the flow through the discharge nozzle. The Applicants' claims recite a vortex inhibitor with an elongated sacrificial member that dissolves before substantially obstructing the discharge nozzle, that time period is based on pour time and environmental

conditions in the pouring nozzle that are not addressed in the prior art relied upon by the Examiner.

The statement that the claimed invention is obvious from the teachings of the prior art is supported only by hindsight guided by the Applicants' present disclosure, and does not provide a proper ground for rejection under 35 U.S.C. § 103. Whereas *Eastwood* teaches a structure for improving the longevity and ease of constructing tailed, throttling elements, the present invention reduces structural longevity and avoids substantial obstruction of the discharge nozzle. As such, the claims of the present invention are not obvious in view of the teachings of *Eastwood* and the knowledge of one of ordinary skill in the art at the time *Eastwood* was made. Applicants respectfully request reconsideration of this rejection in light of the present amendment and remarks.

The Examiner states that all rods when exposed to a molten metal environment would deteriorate to some extent. However, the Applicants claim an elongated sacrificial member that not only deteriorates, but uses deterioration in a manner not taught or suggested by the prior art by dissolving the sacrificial member before substantially impinging on the discharge nozzle. The Applicants' claims define a metal pouring vortex inhibiting buoyant body with an elongated sacrificial member that is constructed to dissolve before substantially obstructing the discharge nozzle to minimize throttling of the metal flow through the pouring hole. (. . . the sacrificial member 32 may enter the discharge nozzle 14 for a limited time before dissipating . . . The sacrificial nature of the elongated member does not impinge on the flow of molten metal through the discharge nozzle 14.) (Page 9, Lines 9-26.) This novel feature is not taught by the prior art, i.e. *Eastwood*. Unlike *Eastwood's* teaching of improved robustness so as to prolong working life outside the harsh environment, a sacrificial member that dissipates before substantial throttling occurs is a substantial departure from improving integrity.

The Examiner also states that the rod of some of the instant claims is coated with deterioration resistant materials. The Applicants disclose that "the sacrificial elongated member may be constructed of hollow or solid metal and can be coated with a refractory

material" (Page 5, lines 11-12). However, the thickness of the refractory can be adjusted depending based on the operating conditions of the metal pouring receptacle, as long as the elongated member is constructed to dissolve to not impinge on the flow of molten metal through the discharge nozzle. (Page 9, Lines 25-26.) Consequently, the sacrificial member does not substantially interfere with the flow of molten metal by dissolving before substantially obstructing the discharge nozzle. (Page 5, lines 17-18.)

In summary, Applicants respectfully assert that the pending claims are patentable in view of the *Eastwood* reference.

Amended claim 1, reciting a sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle is patentable in view of the *Eastwood* reference. Claims 2 through 12 and new claims 30 through 32 depend either directly or indirectly from claim 1 and are, therefore, allowable for at least the same reasons as claim 1 as well as for their own limitations. For instance, claim 4 is directed at an embodiment wherein molten metal is disposed within the hollow chamber upon introduction into the molten receptacle. Claim 9 is directed at an embodiment where crimps extending outwardly from the sacrificial member mount in the hollow chamber to form an integral body and the sacrificial member is filled with a refractory material. These limitations, in combination with the limitations of claim 1, are not found in the prior art.

Applicants respectfully assert that independent claim 13 reciting a sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle is patentable in view of the *Eastwood* reference. Claims 14 through 25 and new claims 33 through 35 depend either directly or indirectly from claim 13 and are, therefore, allowable for at least the same reasons as claim 13 as well as for their own limitations. For instance, claim 14 is directed at a hollow shaft. Claims 23, 24, and 25 are directed at a hollow sacrificial member, a sacrificial member that is positioned snugly over the shaft, and a shaft that extends partially within the body, respectively. Claims 33 through 35 are directed at defining the time period in which the sacrificial member dissolves to avoid substantial obstruction of the discharge nozzle. Claim 33 is directed at an elongated sacrificial member that dissolves before

discharge of molten metal is terminated. Claim 34 is directed at an elongated sacrificial member that dissolves before the discharge nozzle is closed. Claim 35 is directed at an elongated sacrificial member that dissolves before entering the discharge nozzle. These limitations, in combination with the limitations of claim 13, are not found in the prior art.

New independent claim 26, reciting a method for improving metal pouring yield by introducing a vortex inhibitor with a sacrificial member that is constructed to dissolve before substantially obstructing the discharge nozzle and maintaining the vortex inhibitor in the metal pouring vessel during at least a portion of the metal pour, is patentable in light of the *Eastwood* reference. New claims 27 through 29 depend directly from claim 26 and are, therefore, allowable for at least the same reasons as claim 26 as well as for their own limitations. Claims 27 through 29 further define the time period in which the sacrificial member dissolves. For example, claim 27 recites that the elongated sacrificial member dissolves before discharge of the molten metal is terminated. Claim 28 recites that the elongated sacrificial member dissolves before the discharge nozzle is closed. Claim 29 recites that the elongated sacrificial member dissolves before entering the discharge nozzle. These limitations, in combination with the limitations of claim 26, are not found in the prior art.

Support for the present amendments and new claims can be found in the specification: "As the pouring process continues, the sacrificial member can dissolve into the molten metal bath, and thereby does not interfere with the flow of molten metal through the discharge nozzle... These features help orient the refractory body so that its narrow end extends downwardly toward the discharge nozzle of a molten metal receptacle while not reducing the flow of molten metal through the discharge nozzle. When inserted into a molten metal bath, the resulting body and sacrificial member combination has a specific gravity less than the specific gravity of the molten metal. Preferably, the refractory body maintains a center of gravity closer to the narrow end than a center of buoyant support even when the rod has dissolved. Additionally, since the elongated member is sacrificial, it can dissolve before creating a throttling effect upon the discharge flow." (Page 5, Lines 14-30.)

"[T]he sacrificial member 30 may enter the discharge nozzle 14 for a limited time before dissipating. During this initial period before dissipating, sacrificial member stays in the vortex inhibitor 22 in a narrow end 28 downward position. Moreover, sacrificial member 32 can initially align the vortex inhibitor 22 with the area in which the vortex would be likely to form. Even if the sacrificial rod dissolves, the refractory body maintains a center of gravity 29 closer to the narrow end than a center of buoyant support 31." (Page 9, Lines 9-15.)

These passages support a sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle, as claimed in independent claims 1, 13, and 26. These passages also support the addition of dependent claims 27 through 35 that further define the time period in which the sacrificial member dissolves, for example, before discharge is terminated, before the discharge nozzle is closed, and before entering the nozzle. These passages also support the addition of new independent method claim 26 drawn to introducing a vortex inhibitor with a sacrificial member that dissolves before substantially obstructing the discharge nozzle and maintaining that vortex inhibitor in the pouring vessel. For at least these reasons, the present amendments and new claims find support in the specification and new matter has not been added to the application.

The present amendment was not earlier presented because the amendment and argument submitted with the prior amendment addressed all stated grounds for rejection in the prior office action. The present amendments and remarks are directed at further illustrating that the Applicants' claimed sacrificial member is meant to deteriorate to avoid substantial throttling. The Examiner has already conducted a search on the sacrificial member concept since this language was recited in the original claims. Therefore, the present invention does not raise any new issues for search or consideration and does not require any further searching by the Examiner. As such, Applicants submit that the amendment is appropriate for entry, and that the claims are in a condition for allowance. If the Examiner believes that a telephone conference will advance prosecution of this application, the Examiner is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

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Attachment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Once Amended) A vortex inhibitor for molten metal pouring from a discharge nozzle comprising:

a uniform castable refractory body having a generally tapering shape along a longitudinal axis from a base toward a narrow end and a hollow chamber positioned longitudinally to the body extending within the body; and

an elongated sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle and retained by the hollow chamber to form an integral body;

whereby the integral body combining the refractory body and the sacrificial member has a specific gravity less than the specific gravity of molten metal, and is self-orienting in a narrow end downward position when supported in molten metal.

13. (Once Amended) A vortex inhibitor for molten metal pouring from a discharge nozzle comprising:

a uniform castable refractory body having a generally tapering shape along a longitudinal axis from a base toward a narrow end and a shaft positioned longitudinally to the body extending within the body; and

an elongated sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle and retained by the shaft to form an integral body;

whereby the integral body combining the refractory body and the sacrificial member has a specific gravity less than the specific gravity of molten metal, and is self-orienting in a narrow end downward position when supported in molten metal.